

BOTANICAL MUSEUM LEAFLETS

HARVARD UNIVERSITY

CAMBRIDGE, MASSACHUSETTS, FEBRUARY 28, 1974

VOL. 23, No. 9

TYPIFICATION OF *CANNABIS SATIVA* L.

BY
WILLIAM T. STEARN¹

The possibility that the genus *Cannabis* (Cannabaceae) comprises more than one species, as believed by Zhukovsky (1962) and other Russian botanists and as noted by Tutin *et al.* in *Flora Europaea* 1: 67 (1964), or consists of one variable species divisible on fruit characters into several subspecies with differing chemical properties, has made it essential to examine the typification of the name *Cannabis sativa* so as to remove in advance any nomenclatural uncertainty which may otherwise come about if, for taxonomic reasons, the Linnaean epithet *sativa* has to be restricted to one member of the group.

The name *Cannabis sativa* L., having been published by Carl Linnaeus in his *Species Plantarum* 2: 1027 (1753), the internationally accepted starting point for modern botanical nomenclature, is the first legitimate scientific name for the hemp which was grown in Europe in the 18th Century. Here it had been extensively cultivated for many centuries, as is evident from both historical and palynological evidence (summarized by H. Godwin in 1967), being grown primarily for its tough fibres providing cordage and clothing but also for its oily seeds; fortunately, during the period of its maximum use in Europe, the narcotic properties of its resin were unknown there.

¹ British Museum (Natural History), London.

The flowers of hemp are either male (staminate) or female (pistillate). Normally an individual plant bears either male or female flowers but not both. Male and female individuals differ in appearance and longevity, the males having conspicuous loose few-leaved inflorescences and dying earlier than the females, which have compact more leafy inflorescences with much less conspicuous flowers.

Growers of hemp have probably always been familiar with the differences between male and female plants and have long distinguished them as such in a metaphorical manner completely opposed to their biological nature. According to Lefranc (1905), Antoine Rabelais, the father of François Rabelais (c. 1494–1553), grew much hemp on his property at Cinais, southwest of Chinon (Indre et Loire), and young Rabelais probably helped in its cultivation. Rabelais certainly knew everything known then about the character and cultivation of hemp; three chapters of his *Le Tiers Livre des Faictz et Dictz Héroiques du Noble Pantagruel* (1546) are devoted to *l'herbe nommée Pantagruelion*, which is simply hemp. Rabelais here duly mentioned its sexuality: 'Et, comme en plusieurs plantes sont deux sexes, masle et femelle, ce que voyons es lauriers, palmes, chesnes, heouses, asphodele, mandragore, fougere, agaric, aristolochie, cypres, terebynthé, pouliot, peone, et aultres, aussi en ceste herbe y a masle qui ne porte fleur aulcune, mais abonde en semence, et femelle, qui foisonne en petits fleurs blanchastres, inutiles, et ne porte semence qui vaille, et comme est des aultres semblables, ha la feuille plus large, mains dure que le masle, et ne croist en pareille haulteur' (Livre 3, chap. 49).

Sir Thomas Urquhart in his 1693 translation came closer to the original than he usually did, being swept along by his exuberant love of words which Rabelais

would have appreciated, when he rendered this into English as follows: 'And as in diverse plants and trees there are two sexes, male and female, which is perceptible in laurels, palms, cypresses, oaks, holmes [i.e. holm-oaks], the daffodil [i.e. asphodel], mandrake, fern, the agaric [i.e. mushroom], birthwort, turpentine, pennyroyal, peony, rose of the mount and many other such like, even so in this herb there is a male which beareth no flower at all, yet it is very copious of and abundant in seed. There is likewise in it a female, which hath great store and plenty of whitish flowers, serviceable to little or no purposes, nor doth it carry in it seed of any worth at all, at least comparable to that of the male. It hath also a larger leaf and much softer than that of the male, nor doth it altogether grow to so great a height'. The seed-bearing hemp called 'male' here is, of course, the female plant and the sterile hemp here called 'female' is really the male.

Most pre-Linnaean botanical authors, except Ray and Morison, applied the terms *mas* (male) and *foemina* (female) in the same metaphorical way as Rabelais, without any concept of true sexuality in plants comparable to that of animals. Thus, of two kinds, usually distinct species, the more robust or more vigorous or more useful one, especially if having larger leaves or harder wood, was designated 'male' and the inferior one 'female'. Hence, the names *Cannabis sativa* and *C. mas*, as used by Dalechamps, Dodoens and C. Bauhin, refer to female individuals of hemp; and the names *C. erratica*, *C. foemina* and *C. sterilis* refer to male individuals. The name *Cannabis sativa*, which Linnaeus used as a specific name covering both sexes, applied originally only to female individuals. This kind of usage died slowly. As late as 1884, Saint-Lager noted, in his erudite 'Remarques historiques sur les mots "plantes mâles" et "plantes fe-

melles'' ', that farmers in the Rhône basin were still calling pistillate plants of hemp 'chanvre mâle' and staminate plants 'chanvre femelle', because the pistillate plants remained green and robust after the weaker staminate plants had withered, their function as pollinators fulfilled.

In the same manner, C. Bauhin designated the useful female hop-bearing plant of *Humulus Lupulus* as *Humulus mas* and the unproductive male as *H. foemina*.

The difference between male and female plants of hemp necessitates two periods of harvesting. Thus, Philip Miller in his *Gardeners Dictionary*, 8th ed. (1768), recorded that in the east of England 'the first season for pulling the Hemp, is usually about the middle of August, when they begin to pull what they call the Fimble Hemp, which is the male plants These male plants begin to decay soon after they have shed their farina. The second pulling is soon after Michaelmas, when the seeds are ripe: this is usually called Karle Hemp, it is the female plants, which were left at the time the male were pulled'.

The fruit is a small nut, i.e. it has a single seed tightly covered by the hardened wall of the ovary, and is enclosed within a sheathing hairy bract with abundant resin glands which presumably developed in the wild as a protection for the fruit against insects, like the glandular trichomes of other plants (cf. D.A. Levin, 1973). The distinctions, which have been made between the taxa known as *C. sativa*, *C. indica* and *C. ruderalis*, relate to characteristics of the fruit; male plants seemingly provide no diagnostic features; hence for typification a pistillate specimen would be preferable to a staminate one on taxonomic as well as historic grounds.

Linnaeus's protologue in the *Species Plantarum* 2: 1027 (1753) is as follows:

PLATE XXIX



Pistillate specimen of Cannabis in the Clifford Herbarium at the British Museum (Natural History), London. This specimen has been taken as lectotype of the name *Cannabis sativa* L.

Courtesy : British Museum (Natural History).

Cannabis foliis digitatis. Hort. cliff 457.

Hort. ups. 297. *Mat. med.* 457.

Dalib. paris. 300. *Roy. lugdb.* 221.

Cannabis sativa. Bauh. pin. 320. ♀

Cannabis mas. Dalech. hist. 497. ♀

Cannabis erratica. Bauh. pin. 320. ♂

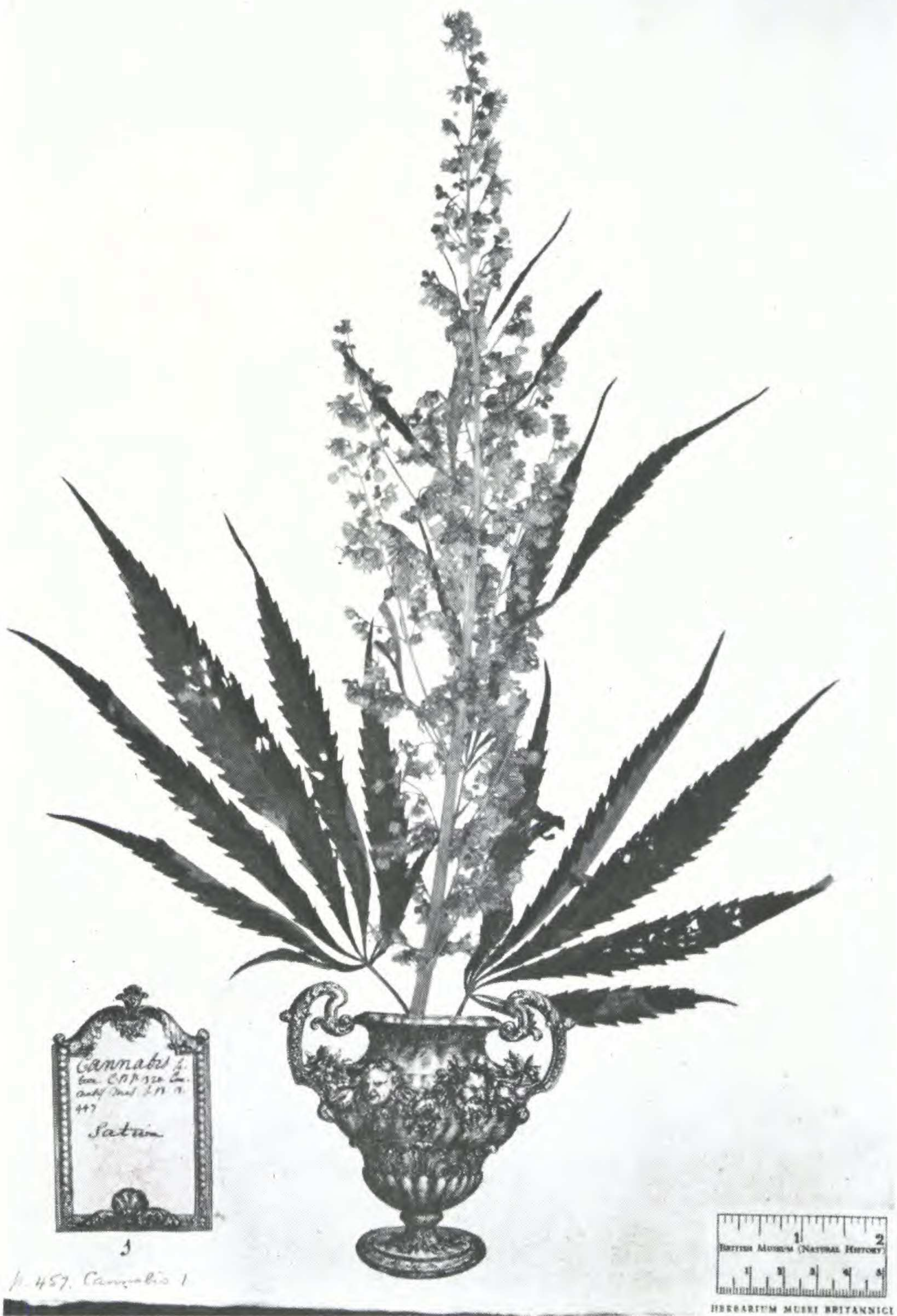
Cannabis femina. Dalech. hist. 497. ♂

Habitat in India.

Several matters in this protologue call for comment. In genera with several species, Linnaeus provided concise diagnostic phrase-names enabling the species thereby to be distinguished, e.g. *Hippophaë foliis lanceolatis* and *Hippophaë foliis ovatis* for *H. Rhamnoides* and *H. canadensis*. Such phrase-names were comparative; they contrasted specific features. In a genus with only one species, such as *Cannabis*, no such diagnostic phrase was required and would indeed have been illogical, since obviously the one and only species could not be contrasted with itself.

Typification of the generic name of such a monotypic genus is essentially the same as typification of the specific name; the nomenclatural type of the one must be the nomenclatural type of the other. Hence, the generic name *Cannabis* L. and the specific name *Cannabis sativa* L. must be permanently associated with the same element. The *Species Plantarum* citations of literature begin with Linnaeus's own *Hortus Cliffortianus* (1738), where fuller synonymy will be found; the other citations likewise refer to plants cultivated in Europe. He used the terms *mas* and *femina* and the signs ♂ and ♀ for male and female plants in a purely biological sense and sorted his synonyms accordingly. Knowing hemp only as a cultivated plant in Europe, he evidently assumed that it must have been introduced from elsewhere, presumably

PLATE XXX



Staminate specimen of Cannabis in the Clifford Herbarium of the British Museum (Natural History), London.
 Courtesy : British Museum (Natural History).

Asia; he had earlier identified with this the male plant figured under the name 'Kalengi-cansjava' in Rheede, *Hortus Malabaricus* 10: t. 60 (1690) and, with some doubt, the female plant figured there in t. 61 (1690); on this evidence, it would seem, he stated 'Habitat in India'. These Rheede illustrations were later cited by Lamarck under his *Cannabis indica* when he separated that as a species distinct from *C. sativa*.

Linnaeus's account of *Cannabis sativa* in the *Species Plantarum* (1753) is to be associated with the description of the genus *Cannabis* in his *Genera Plantarum*, 5th ed., 453, no. 988 (1754), as stated in the *International Code of Botanical Nomenclature* art. 13, note 3 (1972). This description is as follows:

988. CANNABIS* *Tournef.* 308

* *Mas*

CAL. *Perianthium* quinquepartitum: *foliolis* oblongis, acuminato-obtusis, concavis.

COR. nulla.

STAM. *Filamenta* quinque, capillaria, brevissima. *Antherae* oblongae, tetragonae.

* *Femina*

CAL. *Perianthium* monophyllum, oblongum, acuminatum, latere altero longitudinaliter dehiscens, persistens.

COR. nulla.

PIST. *Germen* minimum. *Styli* duo, subulati, longi. *Stigmata* acuta.

PER. minimum. *Calyx* arcte clausus.

SEM. *Nux* globoso-depressa, bivalvis.

The asterisk in the heading CANNABIS* here, as in the first edition, indicates that Linnaeus had based his account on living material, i.e. on plants cultivated in Sweden or Holland. This 1754 description comes, however, unchanged from the first edition of the *Genera Plantarum* 304, no. 749 (1737) published at Leyden, when Linnaeus had charge of Clifford's richly stocked garden at Hartekamp. That work, dealing with the

genera, and his *Hortus Cliffortianus* (1738), dealing with the species, have the same close association as the 1754 *Genera Plantarum* has with the 1753 *Species Plantarum*. Thus, his principal reference under *Cannabis* in the 1753 *Species Plantarum* is to the *Hortus Cliffortianus* 457, which, in turn, refers to the 1737 *Genera Plantarum* no. 749.

In the *Hortus Cliffortianus*, Linnaeus provided a short diagnosis, *Cannabis foliis digitatis*, to distinguish the true hemp from a then imperfectly known plant diagnosed there as *Cannabis foliis pinnatis*, but named *Datisca cannabina* in the first edition of the *Species Plantarum*. In short, Linnaeus's concept of *Cannabis sativa* in 1753 is identical with that of his *Cannabis foliis digitatis* of 1738. Just as John Ray had earlier distinguished functionally male individuals as *Cannabis sativa* 'mas s. sterilis' and female individuals as *Cannabis sativa* 'foemina s. fertilis', so Linnaeus likewise distinguished male and female individuals, allocating pre-Linnaean synonyms to each. The material of *Cannabis* which Linnaeus had for study when preparing the *Genera Plantarum* (1737) and *Hortus Cliffortianus* (1738) is fortunately represented in the Clifford Herbarium, Hortus siccus Cliffortianus, in the Department of Botany, British Museum (Natural History), London, by two good specimens, one (A) male (Plate XXIX), the other (B) female (Plate XXX). Either is available for designation as lectotype. Since, however, the major characters for taxonomic division in *Cannabis* come from fruiting material, the *Hortus siccus Cliffortianus* fruiting specimen (p. 457 *Cannabis* no. 1, B) of *Cannabis sativa* L. is here designated as the lectotype. This specimen represents *C. sativa* as currently commonly accepted. The fruit is about 5 mm. long, 3.5 mm. broad.

If Linnaeus had provided in 1753 a new diagnosis for

Cannabis sativa or had modified in 1754 the generic description of *Cannabis* published in 1737 on the basis of later material—as he did for some other species and genera—then it would be judicious to select a lectotype from this material influencing his final concept of these. In fact, however, he did neither. Hence, as indicated above, the lectotype has to be taken from the earlier material on which his unchanged concepts were based. From this standpoint, the two specimens under *Cannabis* in his herbarium at the Linnean Society of London have only a subsidiary relevance, because they in no way affected his publications. They are, however, of interest on account of their Linnaean association. Linnaean Herbarium specimen 1117.2, illustrated in Joyce & Curry, *Botany and Chemistry of Cannabis* 22 (1970), is a pistillate plant, with fewer than the usual number of leaflets, which are narrowly lanceolate, long acuminate and sharply serrate. It has no epithet but is numbered ‘1’ in Linnaeus’s hand.

Linnaeus began to draft his *Species Plantarum* long before he devised his method of consistent binomial nomenclature for species; even in 1748, he had not devised binomials for the whole vegetable kingdom; hence the most convenient method of arranging and designating his herbarium specimens was to number the species in each folder according to the numbered species entries in his manuscript *Species Plantarum*. When, a few years after 1753, he began to prepare a second edition of the *Species Plantarum*, with changed numbering of specific entries, he ceased to number his specimens but added instead the specific epithet introduced in that work. Thus, a numeral corresponding to an entry in the first edition of the *Species Plantarum* is a valuable indication that Linnaeus possessed this specimen in 1753 or acquired it soon afterwards.

Hence, the numbered pistillate specimen with leaflets characteristic of European hemp, *Linn. Herb.* 1177.2, can be assumed to have been in his hands at this time if not much earlier. The other specimen, *Linn. Herb.* 1177.1, illustrated in Joyce & Curry, *Botany and Chemistry of Cannabis* 21 (1970), is of very different aspect. It is a staminate plant with much shorter and broader almost obtuse more coarsely serrate leaflets. It has no number but is labelled 'sativa' in Linnaeus's hand. Thus, this specimen, in no way typical of *Cannabis sativa* as commonly accepted, can safely be assumed to have come into Linnaeus's possession later than 1753.

The two *Hortus Cliffortianus* specimens belong to the old cultivated hemp stock of northern Europe. This is represented by another contemporary herbarium specimen in the British Museum (Natural History) which was grown in the Chelsea Physic Garden and presented in 1740 to the Royal Society of London under the number 908; for a discussion of the history and nomenclatural importance of these Chelsea specimens, see Stearn (1972). There are also specimens scattered through the herbaria assembled by Sir Hans Sloane (1660–1753) and now in the British Museum (Natural History): vol. 39, fol. 2 (c. 1660), vol. 83, fol. 161 (L. Plukenet, 1642–1706), vol. 85, fol. 62 (G. Bonnivert, fl. 1673–1703), vol. 91, fol. 47 (Plukenet), vol. 117, fol. 2 (A. Buddle, 1660–1715), vol. 167, fol. 393 (G. London, d. 1713), vol. 321, fol. 236 (H. Boerhaave, 1668–1738); see J.E. Dandy (1958).

SUMMARY

Although Linnaeus, when publishing the name *Cannabis sativa* in 1753, gave 'India' as the country of origin of the species, he based his original description on the hemp grown in northern Europe in 1737, which he knew in a living state; this hemp belonged to the long-

cultivated European stock which Rabelais had described at length in 1545 under the fictitious name 'Pantagruelion'. Linnaeus, like his predecessor Ray, correctly distinguished the staminate individuals as 'male' and the pistillate and fruiting individuals as 'female'. Most pre-Linnaean authors, on the general masculine assumption that males were superior or more robust or more useful than females, metaphorically designated the relatively useless male individuals as 'female' and the fruit-bearing female ones as 'male'. A female (pistillate) cultivated specimen in the Clifford Herbarium at the British Museum (Natural History), London, is taken as lectotype of the name *Cannabis sativa* L.

REFERENCES

- Dandy, J.E. Ed. 1958. *The Sloane Herbarium*. London (Trustees of the British Museum).
- Godwin, H. 1967. The ancient cultivation of hemp. *Antiquity* 41: 42-50, 137-138.
- Godwin, H. 1967. Pollen-analytic evidence for the cultivation of *Cannabis* in England. *Rev. Palaeobot. & Palynol.* 4: 71-80.
- Joyce, C.R.B. & S.H. Curry. Ed. 1970. *The Botany and Chemistry of Cannabis*. London (J. & A. Churchill).
- Lefranc, A. 1905. Pantagruelion et Chenevreaux. *Rev. Études Rabelaisiennes* 3: 402-403.
- Levin, D.A. 1973. The role of trichomes in plant defense. *Quart. J. Biol.* 48: 3-15.
- Saint-Lager, J.B. 1884. Remarques historiques sur les mots 'plantes mâles' et 'plantes femelles'. *Ann. Soc. Bot. Lyon* 11 (1883): 1-48.
- Schultes, R.E. 1970. Random thoughts and queries on the botany of *Cannabis*. In Joyce & Curry, 1970: 11-38.
- Stearn, W.T. 1970. The *Cannabis* plant: botanical characteristics. In Joyce & Curry, 1970: 1-10.
- Stearn, W.T. 1972. Philip Miller and the plants from the Chelsea Physic Garden presented to the Royal Society of London, 1723-1796. *Bot. Soc. Edinburgh Trans.* 41: 293-307.
- Zhukovsky, P.M. 1962. *Cultivated Plants and their Wild Relatives*. Transl. by P.S. Hudson. Farnham Royal (Commonwealth Agricultural Bureau).